Dimitra Giannakopoulou

Curriculum Vitae – December 2003

PERSONAL DETAILS

Address:	250 Howes Dr, CA 95032, USA	**Date of birth:**	1 April 1969
Phone:	+1 650 604 0504 (day-time) +1 408 377 8442 (evenings)	**Sex:**	Female
Fax:	+1 650 604 3594	**Nationality:**	Greek (European Union)
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EDUCATION

PHD IN DISTRIBUTED COMPUTING (OCT 94 – MAR 99)

Department of Computing, Imperial College, University of London, UK.
Thesis title: "Model Checking for Concurrent Software Architectures".
Award: PhD grant (4 years) by I.S. Latsis Foundation, Greece.

MSC WITH DISTINCTION, "FOUNDATIONS OF ADVANCED INFORMATION TECHNOLOGY" (OCT 93 – SEP 94)

Department of Computing, Imperial College, University of London, UK.
Thesis title: "Voting Algorithms for Replicated Data".
Award: Scholarship (1 year) by Bodossakis Foundation, Greece.

DIPLOMA OF ENGINEERING IN COMPUTING (SEP 87 – FEB 93). FIRST CLASS HONORS (TOP 2% IN CLASS)

Department of Computer Engineering and Informatics, University of Patras, Greece.
Diploma thesis title: "The Object-Oriented Approach for Geographic Databases".
Award: Scholarship (5 years) by I.S. Latsis Foundation, Greece.

MODEL LYCEUM OF PATRAS, GREECE (SEP 84 – JUN 87)

Top 1% in the National University Entrance Examinations (1987).
Awards: Jan 87: *Distinction*, Jan 85: *1st prize*, at the National Competitions in Mathematics organized by the Greek Mathematical Society.

LANGUAGES

English and French (fluent), German (advanced), Spanish (elementary), Greek (native speaker).

EMPLOYMENT

AUG 2000 – PRESENT: RESEARCH SCIENTIST, RIACS / NASA AMES

Principal Investigator, project on "System Level Verification of Autonomy Architectures", funded by the NASA Intelligent Systems program, Automated Reasoning. Member of the Automated Software Engineering group, NASA Ames. My work focuses on the development and application of automated techniques based on model-checking for the verification of NASA software systems. I investigate incremental and compositional techniques to increase scalability of model checking. My research also aims at identifying properties required of components in the context of specific architectures to avoid integration problems.

I am currently a member of a joint NASA Ames and JPL (Jet Propulsion Laboratory) committee for gap analysis and identification of appropriate technologies for the verification and validation of the Mars Science Laboratory Mission, to be launched in 2009.

OCT 94 – JUNE 2000: RESEARCH ASSOCIATE. DEPARTMENT OF COMPUTING, IMPERIAL COLLEGE

Worked on EPSRC projects TRACTA (GR/J87022 – completed) and BEADS (GR/M24493 – ongoing), focusing on the development of efficient methods and tools to analyze the behavior of distributed systems. Additionally involved in European Union (ESPRIT) research projects ARES (Architectural Reasoning for Embedded Systems – completed) and C3DS (Control and Coordination of

Complex Distributed Services – ongoing), working on modeling and analysis of embedded and workflow systems. Project partners: Philips Research, Nokia, Bull SA, INRIA Research, Univ. of Newcastle, Technical Univ. of Vienna.

MAY 92 – SEP 93: OPERATOR MANAGER. COMPUTER TECHNOLOGY INSTITUTE (CTI), PATRAS, GREECE

Member of technical staff of the Computing Facilities Dept. Coordinator of 30 operators and system administrators, supporting more than 400 users in the University of Patras. Editor of manuals titled "*The operator's guide* " and "*A guide to the Computer Center of CTI* ".

MEMBERSHIP OF PROFESSIONAL BODIES

- Member of the *Technical Chamber of Greece* as a Chartered Engineer since 1993, and student member of the Institution of Electrical Engineers (1995-1998).
- Member of the *ACM (Association for Computing Machinery)* since 1999.

RESEARCH

My research interests are concerned with all aspects of software engineering, and in particular with the design and development of concurrent and distributed systems. My research work focuses on developing efficient and scalable methods and tools for modeling and analysis of distributed systems.

I am a main contributor to the development of the TRACTA model-checking approach and its associated tool, the LTSA. TRACTA exploits the software architecture of a system to construct the system model incrementally from the models of the system's primitive components. This process is combined with the use of minimization techniques to avoid state-explosion. My PhD work was fundamental in setting the theoretical foundations of TRACTA. It contributed a number of techniques for automated analysis of system properties. I am currently investigating compositional techniques for braking up the verification of a system in reasoning about its parts. Recent research results include algorithms for automatically generating assumptions that components need to make about their context to satisfy required properties.

I have applied my research in several domains, including autonomous systems, embedded, workflow and real-time systems, and fault-tolerant and communication protocols. I have published extensively at international journals and conferences. I also act as a regular reviewer for scientific journals and conferences (*IEEE Transactions on Software Engineering, Kluwer Journal on Automated Software Engineering, Springer Requirements Engineering Journal, Elsevier Journal of Systems and Software, ICSE, ESEC/FSE, CAV, ASE* and *SPIN*).

TECHNICAL SKILLS

Programming languages. Developed in Java several extensions to the LTSA model checking tool, a program that analyses finite traces of a running program against Linear Temporal Logic properties, and an LTL to Büchi automata generator for the Java Pathfinder tool for automated verification of Java programs. I have also used Java to teach concurrency issues to Imperial College MSc students, in particular thread programming. Developed in C++ the TRACTA analysis tool, used by industrial project partners in a number of case studies. Used C on the Darwin/Regis distributed platform to implement a framework for the evaluation of voting algorithms, and several such algorithms, as part of my MSc project. I have used Pascal, Fortran, Prolog and Miranda extensively in university course assignments.

Concurrent programming. Used the Regis middleware platform to develop distributed applications. Regis follows a constructive approach to the development of distributed programs by separating structure from computation and communication. I have experience with thread programming in Java.

Operating Systems. Extensive experience with *Unix* variants, *VMS*, *Windows 95/98/2000/NT*, *MacOS*.

***Analysis tools*.** Good knowledge of *SPIN*, *LTSA* and *JPF* tools for analysis of software systems.

ADMINISTRATION

Grants. I have co-authored several NASA proposals, including the proposal that currently funds my research at NASA Ames. I have authored the proposal of the BEADS EPSRC research project, awarded *£196,421*. I have also authored a successful research proposal for financial support by the British Council, under the UK/Hong Kong Joint Research Scheme.

Management. During my employment as an Operator Manager at CTI, I was responsible for the daily operation of the Computer Center of CTI, and of that of the Dept. of Civil Engineering. This involved coordinating the work of 30 operators and system administrators, and preparing weekly-schedules for their work commitments. In September 92, I organized the training seminars offered to the first-year students of the Dept. of Computer Engineering and Informatics, Univ. of Patras (subjects; DOS, Unix, VMS, and networks).

TEACHING

Courses: Taught the "*Concurrent and Distributed Programming*" course for Masters (MSc) students, Dept. of Computing, Imperial College of Science, Technology and Medicine, University of London.

Tutorials/labs: Adviser for tutorials and lab exercises, Dept. of Computing, Imperial College of Science, Technology and Medicine, University of London. Courses: *Software Engineering Design, Concurrent & Distributed Programming, Computer Architecture, Operating Systems*. Adviser for tutorials, Cavendish School of Computer Science, University of Westminster, London. Course: *Discrete Mathematics*.

Project Supervision: I have been the mentor for two consecutive summers for the graduate summer intern Jamieson Cobleigh, from the University of Massachusetts at Amherst, in the context of the prestigious and very competitive USRA SSRP program at NASA Ames. I also co-supervised several MSc dissertation projects at Imperial College, London.

COLLABORATIONS

Aug 03: Invited and funded visit to Carnegie Mellon University, Prof. Edmund Clarke's group.

Feb 03: Invited and funded visit to Microsoft Research.

2003: Ongoing collaboration with Prof. Jeff Magee, several visits to Dept. of Computing, Imperial College, London

Aug 01: Invited and funded visit to the Dept. of Computer & Information Science, Univ. of Oregon, Prof. Steve Fickas' group.

May 99: Invited and funded 1-week visit to Dept. of Computer Science, Univ. of Twente, Netherlands. Research collaboration with Prof. Ed Brinksma's group.

Dec 97 – Feb 99: Several visits to Vérimag Lab, Grenoble, France, directed by Prof. Joseph Sifakis, and to the *VAS-Y* group, INRIA, Grenoble, France, directed by Dr. Hubert Garavel. The visits were funded by a British Council grant.

Jul 97 & Jun 96: Invited and funded 3-week and 2-month visits, respectively, to Dept. of Computer Science, Hong Kong University of Science and Technology. Research collaboration with Dr. S.C. Cheung, on model checking of distributed systems.

EVENTS AND COMMITTEES

Future:

- *PC member*, 27th International Conference on Software Engineering (ICSE 2005).
- *PC member*, International Symposium on Component-Based Software Engineering (CBSE'7).

2003:

- *Organizer* (with Mike Barnett – Microsoft Research, Prof. Gary Leavens – Iowa State, and Prof. Steve Edwards – Virginia Tech) of 2nd workshop on Specification and Verification of Component-Based Systems (SAVCBS), associated with ESEC/FSE 2003 (European Software Engineering Conference and ACM SIGSOFT Symposium on the Foundations of Software Engineering).
- *PC member*, 18th IEEE International Conference on Automated Software Engineering (ASE 2003).
- *PC member*, Workshop on Model Checking and Artificial Intelligence (MoChArt-03) associated with IJCAI 03 – 18th international joint conference on artificial intelligence
- *PC member*, Workshop on Service-Based Software Engineering, associated with FM 2003 – the 12th International Formal Methods Europe Symposium
- *PC member*, Workshop on Intelligent Technologies for Software Engineering (WITSE'03) – associated with ESEC/FSE 2003, joint meeting of the European Software Engineering Conference and ACM SIGSOFT Symposium on the Foundations of Software Engineering.
- *PC member*, 6th Workshop on Component-Based Software Engineering (CBSE'6): Automated Reasoning and Prediction, associated with the International Conference on Software Engineering (ICSE 2003).

2002: *PC member*, 5th Workshop on Component-Based Software Engineering (CBSE'5), associated with the International Conference on Software Engineering (ICSE 2002).

2001: *Organizer* (with Prof. Gary Leavens – Iowa State and Prof. Murali Sitaraman – Clemson) of 1st workshop on Specification and Verification of Component-Based Systems (SAVCBS), associated with OOPSLA 2001 (Object-Oriented Programming, Systems, Languages, and Applications).

PUBLICATIONS

SUBMITTED

1. Cobleigh, J.M., Giannakopoulou, D., and Pasareanu, C.S. "A Learning Framework for Automatic Assume-Guarantee Verification". Invited to special edition of International Journal on Software Tools for Technology Transfer (STTT), submitted October 2003.

JOURNALS

2. Guillaume Brat, Dimitra Giannakopoulou, Allen Goldberg, Klaus Havelund, Mike Lowry, Corina Pasareanu, Arnaud Venet, Willem Visser, Rich Washington. "Experimental Evaluation of V&V Tools on Martian Rover Software". *Journal of Formal Methods in System Design,* Kluwer Academic Publishers, *to appear.*
3. Giannakopoulou, D., Pasareanu, C.S., and Barringer, H., Component Verification with Automatically Generated Assumptions. *Journal of Automated Software Engineering*, Kluwer Academic Publishers, *to appear*.
4. Giannakopoulou, D., Kramer, J., and Cheung, S.C. "Analysing the Behaviour of Distributed Systems using TRACTA," *Journal of Automated Software Engineering, special issue on Automated Analysis of Software*, vol. 6(1), January 1999. R. Cleaveland and D. Jackson, Eds, Kluwer Academic Publishers.

CONFERENCES

5. Giannakopoulou, D., Pasareanu, C., and Cobleigh, J.M. "Assume-guarantee Verification of Source Code with Design-Level Assumptions", *Proc. of the 26th International Conference on Software Engineering (ICSE'2004)*, Edinburgh, Scotland, May 2004, *to appear*.

6. Giannakopoulou, D. and Magee, J. "Fluent Model Checking for Event-Based Systems", in *Proc. of the 4th joint meeting of the European Software Engineering Conference and ACM SIGSOFT Symposium on the Foundations of Software Engineering (ESEC/FSE 2003)*, September 2003, Helsinki, Finland.

7. Barringer, H., Giannakopoulou, D., and Pasareanu, C.S. "Proof Rules for Automated Compositional Verification through Learning". *2nd Workshop on Specification and Verification of Component-Based Systems (SAVCBS'03)*, associated with the 4th joint meeting of the European Software Engineering Conference and ACM SIGSOFT Symposium on the Foundations of Software Engineering (ESEC/FSE 2003).

8. Cobleigh, J.M., Giannakopoulou, D., and Pasareanu, C.S. "Learning Assumptions for Compositional Verification", in *Proc. of the 9th International Conference for the Construction and Analysis of Systems (TACAS 2003)*. April 2003, Warsaw, Poland. Springer, LNCS 2619.

9. Guillaume Brat, Dimitra Giannakopoulou, Allen Goldberg, Klaus Havelund, Mike Lowry, Corina Pasareanu, Arnaud Venet, Willem Visser. "Experimental Evaluation of V&V Tools on Martian Rover Software". *SEI Software Model Checking Workshop*, March 2003.

10. Giannakopoulou, D. and Lerda, F. "From States to Transitions: Improving translation of LTL formulae to Büchi automata", *in Proc. of the 22nd IFIP WG 6.1 International Conference on Formal Techniques for Networked and Distributed Systems (FORTE 2002)*. November 2002, Houston, Texas. Springer, Lecture Notes in Computer Science.

11. Giannakopoulou, D., Pasareanu, C., and Barringer, H. "Assumption Generation for Software Component Verification", in *Proc. of the 17th IEEE International Conference on Automated Software Engineering (ASE 2002)*. September 2002, Edinburgh, UK.

    *** Awards: Best paper, ACM distinguished paper award.

12. Giannakopoulou, D. and Havelund, K. "Automata-Based Verification of Temporal Properties on Running Programs", in *Proc. of the 16th IEEE International Conference on Automated Software Engineering (ASE 2001)*. November 2001, San Diego, USA.

13. Giannakopoulou, D. and Penix, J., "Component Verification and Certification in NASA Missions", in *Proc. of the 4th ICSE Workshop on Component-Based Software Engineering: Component Certification and System Prediction*, Toronto, Canada, May 2001.

14. Karamanolis, C., Giannakopoulou D., Magee, J., and Wheater, S., "Model Checking of Workflow Schemas". In *Proc. of the 4th International Conference on Enterprise Distributed Object Computing (EDOC 2000)*, Makuhari, Japan, IEEE Computer Society, September 2000.

15. Magee, J., Pryce, N., Giannakopoulou, D., and Kramer, J., Graphical Animation of Behavior Models, in *Proc. of the 22d International Conference on Software Engineering* (*ICSE'2000*), Limerick, Ireland, June 2000.

16. Giannakopoulou, D., Magee, J., and Kramer, J. "Checking Progress with Action Priority: Is it Fair?" in *Proc. of the 7th European Software Engineering Conference held jointly with the 7th ACM SIGSOFT Symposium on the Foundations of Software Engineering (ESEC/FSE'99)*, Toulouse, France, September 1999. Lecture Notes in Computer Science 1687, pp.511-527. O. Nierstrasz and M. Lemoine, Eds.

17. Magee, J., Kramer, J., and Giannakopoulou, D. "Behaviour Analysis of Software Architectures," in *Proc. of the 1st Working IFIP Conference on Software Architecture (WICSA1)*, San Antonio, TX, USA, 22-24 February 1999.

18. Magee, J., Kramer, J., and Giannakopoulou, D. "Software Architecture Directed Behaviour Analysis," in *Proc. of the Ninth IEEE International Workshop on Software Specification and Design (IWSSD-9)*, Ise-shima, Japan, April 16-18 1998, pp. 144-146.
19. Magee, J., Kramer, J., and Giannakopoulou, D. "Analysing the Behaviour of Distributed Software Architectures: a Case Study," in *Proc. of the 5th IEEE Workshop on Future Trends of Distributed Computing Systems*, Tunis, Tunisia, October 1997, pp. 240-245.
20. Cheung, S.C., Giannakopoulou, D., and Kramer, J. "Verification of Liveness Properties using Compositional Reachability Analysis," in *Proc. of the 6th European Software Engineering Conference held jointly with the 5th ACM SIGSOFT Symposium on the Foundations of Software Engineering (ESEC/FSE'97)*, Zurich, Switzerland, September 1997. Lecture Notes in Computer Science 1301, pp.227-243. M. Jazayeri and H. Schauer, Eds.
21. Giannakopoulou, D., and Kramer, J. "An Integrated Environment for the Design and Analysis of Distributed Systems", 3d Cabernet Plenary Workshop, Rennes, France, 16-18 April 1997.
22. Giannakopoulou, D., Kramer, J., and Cheung, S.C. "TRACTA: An Environment for Analysing the Behaviour of Distributed Systems," in *Proc. of the 1st ACM Sigplan Workshop on Automated Analysis of Software (AAS'97)*, Paris, France, January 1997, pp. 113-125. R. Cleaveland and D. Jackson, Eds.

    *** Together with two other papers presented at the workshop, this was selected as *best paper*. Extended versions of the three papers have been published in the ASE journal (see 1).

INVITED

23. Giannakopoulou, D., Kramer, J., and Magee, J. "Behaviour Analysis Based on Software Architecture," in *Proc. of the International Workshop on the Role of Software Architecture in Testing and Analysis (ROSATEA)*, Marsala, Sicily, Italy, June 1998. D. Richardson, P. Inverardi, and A. Bertolino, Eds.
24. Giannakopoulou, D., Kramer, J., and Magee, J. "Practical Behaviour Analysis for Distributed Software Architectures". UK Programmable Networks and Telecommunications Workshop, Hewlett-Packard Laboratories, Bristol. September 1998.

RESEARCH REPORTS

25. Giannakopoulou, D. and Lerda, F., "Efficient translation of LTL formulae into Büchi automata", RIACS/USRA Technical Report, 01.29, June 2001.
26. Giannakopoulou, D. and Havelund, K., "Runtime Analysis of Linear Temporal Logic Specifications", RIACS/USRA, Technical Report, 01.21, August 2001.
27. Karamanolis, C., Giannakopoulou, D., Magee, J., and Wheater, S. "Modelling and Analysis of Workflow Processes," Dept. of Computing, Imperial College, London, Research Report, May 2000.
28. Giannakopoulou, D. "Modelling and Analysis of the Bounded Retransmission Protocol: Experience with Discrete Time" Imperial College, London, Research Report, 2000.
29. Giannakopoulou, D. "The TRACTA Approach for Behaviour Analysis of Concurrent Systems," Dept. of Computing, Imperial College, London, Research Report, September 1995.
30. Giannakopoulou, D., and Hadzilacos, T. "Modelling Geographic Applications with Objects: Promises and Limitations," Computer Technology Institute Technical Report, March 1994.

PRESENTATIONS

INVITED

Sep 03: *Seminar, SRI International, Menlo Park, California, USA.* . Title: "Automated assume-guarantee reasoning for component verification".

Aug 03: Specification and Verification Centre (SVC) *Seminar,* Carnegie Mellon University, Pittsburgh, USA. Title: "Automated assume-guarantee reasoning for component verification".

May 03: *Seminar,* Autonomy and Robotics group, NASA Ames Research Center, Moffett Field, USA. Title: "Automatic Assumption Generation for Compositional Verification".

Mar 03: *Presentation, Computer Science Dept, Stanford University, USA*. Title: "Automatic Assumption Generation for Compositional Verification".

Feb 03: *Seminar, Microsoft Research, Redmond, USA*. Title: "Automatic Assumption Generation for Compositional Verification".

Sep 02: *Presentation, Distributed Software Engineering Group, Dept. of Computing, Imperial College*, *London.* Title: "Assumption Generation for Software Component Verification".

Sep 02: *Presentation, NASA Intelligent Systems Program – Automated Reasoning Review Workshop, Monterey, CA, USA*. Title: "Modular verification for Autonomous Systems".

Aug 01: *Seminar, Computer Science Dept, University of Oregon, Eugene, USA*. Title: "Reasoning about Large Systems in a Compositional Way".

May 01: *RIACS seminar, NASA Ames, CA, USA*. Title: "Reasoning about Large Systems in a Compositional Way".

Nov 99: *Dagstuhl Seminar on Rigorous Analysis and Design for Software Intensive Systems*, *Dagstuhl, Germany*. Title: "Analyse This!".

May 99: *Seminar, SRI International, Menlo Park, California, USA*. Title: "Modelling and Analysis based on Software Architecture".

May 99: *Seminar, Dept. of Computer Science, University of Twente, The Netherlands.*Title: "Modelling and Analysis based on Software Architecture".

Jun 98: *ROSATEA Workshop, Marsala, Sicily, Italy*. Title: "Behaviour Analysis based on Software Architecture".

Dec 97: *Seminar, INRIA, Grenoble, France.* Title: "Behaviour Analysis of Distributed Systems using TRACTA".

Apr 97: *Seminar, Dept. of Computing, Imperial College.* Title: "An Environment for the Behaviour Analysis of Distributed Systems".

Jul 96: *Seminar, Dept. of Computer Science, Hong Kong University of Science & Technology.* Title: "An Introduction to TRACTA".

CONFERENCES

Presented publications 6, 7, 8, 10, 11, 12, 13, 14, 16, 20, 21, 22, and 23 above.